# The Weather Vein

CERAMIC NUMBER

# Experience develops CHARACTER as fire makes plastic clay strong and unyielding

The Business of the

**Carrier Engineering Corporation**

involves the application of the scientific principles of

**AIR CONDITIONING**

to the Practical Requirements of

**INDUSTRY**

Humidification Dehumidification

Evaporative Cooling

Air Cooling by Refrigeration

Heating Ventilation

and

**DRYING**

At Low Temperatures and Low Humidities

At Medium Temperatures and High or Low Humidities

At High Temperatures, from 200° to 1000° F.

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**THE PIPING DIVISION**

offers a complete service for the design and installation of Power and Process Piping of all Kinds

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We Invite Correspondence

# The Weather Vein

for September, 1921

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## Ceramic Number

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See our Exhibit *at the* SEVENTH NATIONAL EXPOSITION CHEMICAL INDUSTRIES New York City Sept. 12-17 1921

OCTOBER WILL BE THE MACARONI NUMBER

# The Weather Vein

Published monthly by the

**Carrier Engineering Corporation**

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**WEATHER being a subject of general and absorbing interest, this little book is dedicated to the dissemination of knowledge concerning weather—and the fact that weather can be manufactured.**

There's a way to make
"Every day a *good* day"
Each issue of the Weather Vein
is a guide-post on the way
Are you a regular subscriber?
The subscription price is your request.
To make sure that the book reaches you individually
please write your name and title plainly

## THE CONQUEST OF CLAY

AJESTICALLY towering above its fellows, there stands, at Michigan Boulevard and the River, in Chicago, a monument to *a man*—but in its greater significance—a monument to *men*.

The monument is the new Wrigley Building. The man is William Wrigley, Jr., who has built his business, one of the signal successes of his time, upon the principle of just deserts. He believed that if he made his product as well as possible, and then advertised broadly enough to *keep* people aware of its goodness, he would deserve to succeed, and since we usually acquire our just deserts, he believed that he *would* succeed. And he has.

*Spearmint, Doublemint* and *Juicy Fruit* gently, but persistently, remind you of their goodness. Wherever you may turn, from the famous animated electric sign at Times Square, to the brightly colored poster in the tank town grocery store, Wm. Wrigley's jolly little spearmen smile their way into your remembrance. "The flavor lasts," but, more importantly, so does Wm. Wrigley's adherence to his principles.

Someone has calculated how many millions of sticks of chewing gum are represented by the Wrigley Building. To us the Wrigley Building represents far more than chewing gum, or even business sagacity.

It has been our pleasure to know the Wrigley organization intimately, because they believe in our principle, "Every day a *good* day,"

THE NEW WRIGLEY BUILDING

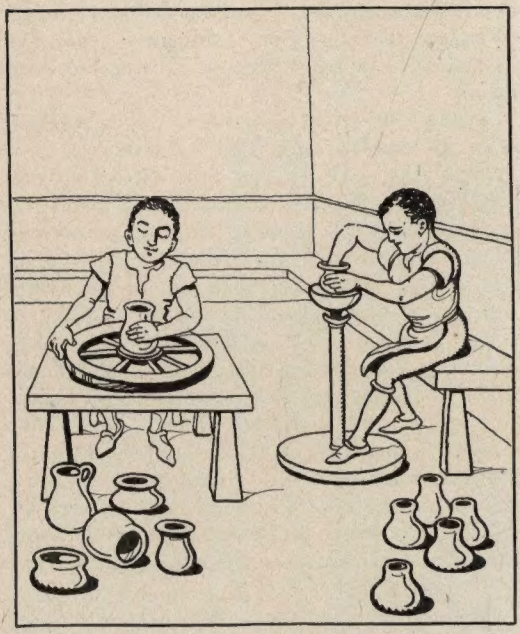
and Manufactured Weather helps to make Wrigley's chewing gum uniformly good, day in and day out, regardless of the weather outdoors.

Surely, by now, you must be wondering what all this has to do with Ceramics.

Just this. When we first looked at the Wrigley Building we thought of Wm. Wrigley, and then, of course, of chewing gum—and then we began to take in details. We noted the striking architectural beauty of the building. Our eyes began to leap from story to story, upward. We observed that the entire structure is finished in special terra cotta, lending its beautiful softness of tone to the whole surface of the building. The lower two stories, a pleasant gray in color—the third story a dark cream color— the upper stories a lighter cream tint, the whole surmounted by the magnificent clock tower—its face of white enameled terra cotta, its hour divisions marked in deepest black.

We were impressed particularly by the beautifully modeled friezes and entablatures which adorn the building, the handsome cornices, the magnificent capitals which beautify the tower—and we were glad to know that even in the beauty of the building itself we had had a part.

For all of the terra cotta used in the construction of the Wrigley Building—2,700 tons of it—was manufactured by the Northwestern Terra Cotta Company, of Chicago, and all of it was dried by the Carrier Ejector System—which led us to the thought—expressed in our



*Ancient Italian Potters at their Wheels, a Pen Sketch by Carl Schultze, from an old Drawing.*

---

first paragraph—that the Wrigley Building is a monument to *men*.

The terra cotta in the Wrigley Building is, perhaps, the highest development of this branch of the Ceramic Art, representing, as it does, the most advanced methods of manufacture, and the most highly artistic treatment

of the decorative possibilities. It stands, therefore, as a monument to men—the countless legions of men who have made clay the stuff of dreams.

For, before the dawn of history, men began their conquest of clay. The first rude vessels of clay, inspired by the direst need, were fashioned by hand and dried in the sun, countless ages ago. Then, as fire became a servant of man's will, it was discovered that clay could be made as hard as stone, and as imperishable.

Each of the prehistoric peoples developed, to some extent, the use of clayware. The early clayworker used only those clays immediately available, but as the clayware of one locality was transported to another, it was discovered that different clays possessed different characteristics and fired to different colors. Then was the Ceramic Art born, for, besides the physical qualities of the ware, men began to observe the possibilities of decoration—the birth of beauty—and adown the long trails of history one finds, everywhere, evidences of the potter's progress.

Some ancient worker in clay, laboriously building up his shapes with his hands and the crudest tools, found that by placing the plastic mass upon the flattened side of a rock he could turn the rock so as to bring every part of his pot, in succession, under his hand. Thus was invented the potter's wheel. The early wheels were operated either by the hand or the foot, the piece being modeled by the hand of the potter as wood is turned in the lathe with a sharpened tool.

The ancient Egyptians evolved wondrously colorful decorative schemes and adorned their ware so individually that it is easily distinguished from all other ware of their times. The Greeks produced marvels of form in clay. Even today, one speaks of "a Greek vase" as a model of exquisite proportions.

Then the Romans, who spread their knowledge of the potter's art over all the lands which fell under the sway of their conquering swords—from the Euphrates to the Atlantic—from Egypt to the Wall of Hadrian.

Meanwhile the Chinese—the greatest potters of the ages—were quietly developing their knowledge and skill, until finally they produced the marvelous white translucent porcelain which was one of the wonders of the medieval world.

No one knows when the first glaze was developed, but it was probably discovered by the early Egyptians. All of the ancient glazes were a coating of fired glass, and it is probable that the art of glazing was discovered independently by many of the ancient peoples who had some knowledge of glass-making.

The art of coloring and decorating ceramic ware was developed independently by all of the ancient peoples. The simplest color schemes were executed in the different colors of natural clays, but various colored glazes were developed by different races, involving the use of the oxides of iron and copper, which produce greens; pure copper which yields a turquoise, and manganese, which produces a beautiful, uncertain purple. The Chinese ex-

tensively developed the art of colored glazing, and the beauty of the decorated porcelains of the Sung period (10th Century) has never been surpassed, even in modern times.

Much of our knowledge of ancient history has been preserved to us in the early ceramic wares of the races. Figures and scenes used in the decoration of vases and other ware, models in clay, and—notably in the case of the Egyptians—cylinders or prisms of clay were used as tablets upon which historical data were recorded.

The earliest use of ceramic ware for architectural construction and decoration seems to have been developed by the Babylonians and Assyrians. These peoples produced glazed bricks of remarkable coloring, and created marvelous decorative friezes, depicting scenes of battle and events of current importance.

Through the years men have constantly developed the Ceramic Art. Today bricks and tiles and terra cotta are common materials of construction and decoration. Fine china and porcelain beautify even our humblest tables, and modern sanitary ware brings to us everywhere comforts and conveniences unknown but a few decades ago.

Clays from all parts of the world are brought together and scientifically blended to produce ware of given characteristics.

The story of the Northwestern Terra Cotta Company is a romance of modern business development. The beautiful friezes, entablatures and cornices of the Wrigley Building were especially designed by highly trained

Interior of an Ejector Dryer, Northwestern Terra Cotta Co., Chicago, showing the Method of Loading the Green Ware.

artists. These artists work in soft clay. When the design is completed, it is divided into sections of suitable size, and from these plaster of Paris casts are made. The casts are then assembled as molds, and into these molds is pressed the moist, plastic clay, which is the raw material of terra cotta. When the mold has been carefully pressed or filled, it is turned over onto a flat pallette and the plaster of Paris casts are removed, one by one.

The molded piece then goes to the finisher, who smooths out any rough spots and removes the fins left by the cracks between the sections of the casts.

From the finisher the piece goes to the dry room, where it is dried hard.

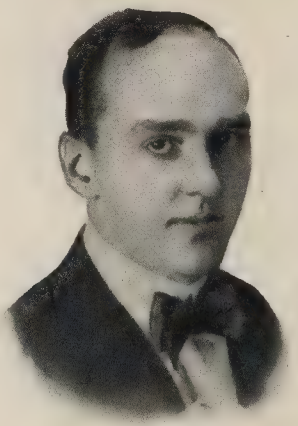
After drying, the piece goes to the sprayers, where the various colors and glazes are sprayed on, the piece then being placed in the kiln for firing. The piece remains in the kiln from ten days to two weeks, being burned at a temperature of about 1800° F.

When it is removed from the kiln the pieces are matched and fitted so that when set side by side they are the finished reproduction of the artist's original design.

Practically all of the pieces manufactured by the Northwestern Terra Cotta Company are hand-modeled.

Certain terra cotta tiles used for both exterior and interior decoration are, however, machine pressed in standard molds, the processes of manufacture being otherwise substantially the same.

Interior of an Ejector Dryer, Northwestern Terra Cotta Co., Chicago, showing the Metal Doors and the Ejector Nozzles.



*Harry B. Matzen*

We feel that the drying methods employed by the Northwestern Terra Cotta Company represent the very highest attainment of the art, and since it has been our pleasure to cooperate with them in the development of this equipment, we are, justly, we think, proud of the results obtained.

Most of the development work was conducted by our own Harry B. Matzen, of the Chicago office, and we feel that he has contributed notably to modern Ceramic Art.

This has been recognized signally by the Midland Terra Cotta Company of Chicago; La Clede-Christy, of St. Louis, largest manufacturers of refractory material in the United States; the Gladding, McBean Company, of Lincoln, California, and the Pittsburgh Plate Glass Company, of Ford City, Pa.; all of whom have installed Carrier Ejector Dryers, as developed by Mr. Matzen.

Entering End of Carrier-Equipped Continuous Dryer for Porcelain Insulators of Various Sizes and Compositions, General Electric Co., Schenectady, N. Y.

## THE DRYING OF CERAMIC WARE

THE plastic clay of which Ceramic Ware is molded or shaped, contains from 20% to 25% water, when used for hand or machine molding, and greater quantities of water when used as *slip,* which is fluid enough to cast in molds by flowing.

Whether the piece is built up by hand, pressed into molds or machine molded, or poured into absorbent molds as slip, the molded piece must be immediately dried and its moisture content reduced to about 3% of its dry weight. The ware is then ready to be glazed or otherwise finished, and fired in the kiln.

The drying operation is the most difficult and important step in the entire manufacturing process. So far as plant routine or the production schedule is concerned, the drying is the controlling factor, since pieces cannot be molded faster than they can be dried, nor can they proceed to the final glazing and firing until they have been properly dried.

The drying methods still in use by some manufacturers are so astonishingly archaic as to surpass belief.

It is, of course, necessary to dry the piece *from the inside out,* so to speak, preventing surface-drying or "case-hardening." The reason for this is obvious. If the piece be exposed to very dry air, the moisture will be rapidly removed from its surfaces. The surfaces will quickly harden and shrink. Since this surface-drying occurs before the interior moisture is removed, the shrinkage of the sur-

The Modeling Room, Northwestern Terra Cot
Are Hand-Modeled in Soft Clay by Skilled Artists.

ta Co., Chicago, where Special Architectural Pieces
See the Text.

face is far greater than the shrinkage of the interior. The strains so set up cause the surface to *check* or crack, and the piece is either entirely ruined or its value is greatly impaired. This is especially true of very large pieces, such as glass melting pots, architectural terra cotta and heavy sanitary ware.

In the old days the green pieces were dried in steam-heated rooms where the Relative Humidity of the heated air was, of course, very low. Attempts were made to partly control the drying of the pieces by "babying" them. If a piece dried too rapidly at the surface, or in certain spots, wet cloths were placed over it, thereby retarding the drying by increasing the Relative Humidity in the immediate vicinity. Such unbelievably crude methods resulted in appalling losses. Certain plants sustained losses as high as 50%, due to faulty drying. Oftentimes such faults would not be apparent when the pieces were removed from the dryer, and would only appear when the ware was fired in the kiln. This caused a further loss—the expense of handling and firing.

Under such old methods the drying was extremely slow, requiring, for large pieces, many months. This required an immense floor space for ware in process of manufacture, and a correspondingly large outlay of idle capital. Further, the production of a given plant was very uncertain, depending upon the vagaries of the outdoor weather, and delivery schedules suffered accordingly.

The fact, however, that under certain especially favorable weather conditions, even with the old drying methods, losses were greatly reduced and the time of drying materially decreased, should long ago have pointed to conditioned air drying.

The average potter, however, was slow to attempt improvements in his processes. This is partly explained by the trial and failure of many ill-advised schemes which were foisted upon them by persons without sufficient technical knowledge to fully grasp the problems involved.

Some years ago we undertook to apply the principles of Manufactured Weather to the requirements of the ceramic industry.

We are proud of the results that have been obtained, but we are prouder still of the confidence and cooperation we have enjoyed on the part of those progressive manufacturers who have helped us to pioneer scientific methods in the drying of ceramic ware.

### Ceramic Dryers

The principal requirements of the successful Ceramic Dryer are:

(1) Accurate temperature control.

(2) Sensitive control of Relative Humidity.

(3) Positive, uniform, vigorous circulation of the conditioned air within the kiln.

So much has been said with reference to these factors that we are content to summarize them briefly here, offering to provide, for those interested in the technical details, whatever

information they may request. We especially refer to THE WEATHER VEIN for May, 1921, Drying Number, which contains a comprehensive survey of drying and dryers.

Temperature and Relative Humidity control is effected by means of sensitive and dependable instruments acting upon standard air conditioning apparatus, and regulating the conditions continuously within a negligible variation, regardless of outdoor conditions, winter or summer.

The factor of air circulation, perhaps most important of all, is accomplished by means of the Carrier Ejector System. This system of air distribution causes a vigorous, steady and uniform air movement within the kiln. It does this, also, at reasonable cost, both initially, for apparatus, and afterwards for operation, because the Ejectors circulate *within the kiln* from three to five times as much air as is actually delivered through the nozzles. Since only that air which is delivered through the nozzles must be conditioned, it is obvious that great savings in installation and operating costs are realized.

Ejector distribution is so positive and uniform that every piece within the kiln is dried evenly and thoroughly, free from internal drying stresses, and ready to proceed to the following operations. Before the Ejector System was applied to Ceramic Dryers, it was necessary to inspect each piece as it left the drying room, and many pieces had to be returned for further drying.

## Glass Pots

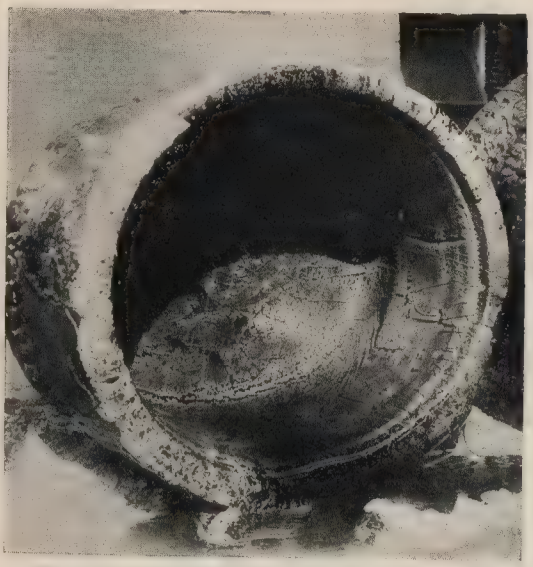
A Carrier Ejector Dryer at the Ford City, Pa., plant of the Pittsburgh Plate Glass Company has revolutionized the manufacture of large refractory ware of this type.

Their glass pots are oval in shape, the greater diameter being about 66″, the lesser about 54″, and the height about 36″. The green pot, before drying, weighs about 3,600 pounds. The dry weight of the finished pot is about 2,800 pounds, a loss of slightly less than 20%, which is the moisture removed in drying.

The bottom of the pot is first shaped and partly dried. Then successive spells are added and partly dried. The first spell makes the height 18″, the second 26″, the third, which projects to engage the crane tongs, brings the height to 32″, and the fourth, or finishing spell, to 36″.

Before the Ejector System was installed, a period of from eight months to one year was required to dry each pot. In spite of the greatest care, many crissles, or cracks, developed, oftentimes spoiling the pot after months of preparation. These cracks were due to drying strains, set up by the variable rates at which different parts of the pot dried. This variation was due to the varying thickness of the pot, the bottom being much heavier than the side walls.

The Ejector System has reduced the drying time to from 43 to 55 days, and has practically eliminated drying faults, such as cracks or



*This Ejector-Dried Glass Pot had just been retired on account of Old Age. It was dried in 55 Days, made 44 Melts, and remained in the Furnace 60 Days. Pittsburg Plate Glass Co., Ford City, Pa.*

crissles. The average life of pots dried by the old methods was 15 melts of glass. Pots dried by the Ejector System are averaging about 34 melts, one of them yielding 44 melts.

An installation of the Ejector System is now being made at the St. Louis plant of La Clede-Christy, largest manufacturers of refractory ware in the United States.

## Terra Cotta

At the plants of the Northwestern Terra Cotta Company and the Midland Terra Cotta Company, Chicago, Ejector Equipment has brought the dawn of a new day in terra cotta manufacturing.

Under the old methods of drying, the length of time required depended entirely upon outdoor weather conditions, varying from 14 to 50 days, depending upon the size of the pieces.

Today the Ejector System is drying pieces weighing up to 125 pounds in eighteen hours, and pieces weighing 70 pounds and less in from fourteen to sixteen hours.

All of the pieces leave the dryer uniformly dry, and it is not necessary to replace certain pieces for further drying, as is unavoidable with the old hot-room method or with other "fan systems."

The green ware is delivered to the dryer as soon as it is removed from the molds, rendering unnecessary the great floor space hitherto devoted to green storage.

Mr. F. E. Ortman, formerly of the Northwestern Terra Cotta Company, now Vice-President and General Manager of the Tropico Potteries, Inc., Glendale, California, and Vice-President of the American Ceramic Society, in a paper before the society said:

> "There is (with the Ejector System) a saving of at least 50% in the floor space required to dry a given amount of terra cotta, due to the more rapid turnover and

to the less space required for green storage.

"Drying is regularly accomplished in 18 hours, and frequently in from 14 to 16 hours. This permits a close adherence to schedules.

"It frequently happened, in the old method of drying, due to variation in atmospheric conditions, steam pressure and lack of both temperature and humidity controlling equipment, that a considerable proportion of the ware would have to be drawn from the box and reloaded, because of incomplete drying. Under the present system this is entirely eliminated, with a considerable saving in labor cost.

"There has been a decided reduction in the number of cracked and warped pieces. In fact, it may be said that the only cracking or checking which occurs may invariably be traced to other causes than the drying operation."

From actual tests made by the Northwestern Terra Cotta Company, the steam consumption, in drying with the Ejector System, was considerably less than that previously required with their former "fan system."

Carrier Ejector Equipment is now being installed for the Northern Clay Company, at Auburn, Washington, and for the Gladding, McBean Company, at Lincoln, California. These two plants produce about 75% of the terra cotta manufactured on the Pacific Coast, also making common brick, face brick, sewer and drain tile and crucibles.

We believe, in view of the facts set forth, that this list is going to grow apace. We will welcome the opportunity to cooperate with any other ceramic manufacturer who wants to make "Every day a *good* day."

### Electrical Porcelain

The Carrier System has been applied to the drying of electrical porcelain, notably at the plant of the General Electric Company, Schenectady, New York, with the same remarkable results, practically eliminating warps or checks in drying, and producing pieces of premier quality.

### Sanitary and Chemical Ware

The size, weight and shape of sanitary ware vary so greatly that drying is a matter of great difficulty in many plants. This is true, too, of chemical ware.

The Ejector System, with its flexibility of adjustment and application, together with the accurate automatic control, successfully meets the varying requirements of sanitary and chemical ware production. Pieces of widely varying weights and proportions can be dried at the same time with absolute uniformity of drying and freedom from warping or checking.

### An Invitation

We will be glad to correspond with manufacturers interested in efficient scheduled production, or, when desirable, we will be equally glad to arrange a personal interview, either at your plant or here at our Laboratories.

## ADVENTURES OF

# The Mechanical Weather Man

## THE CERAMIC CASE

The Messrs. Take and Mixit make Terra Cotta Ware
And other things of clay that need the very greatest care.

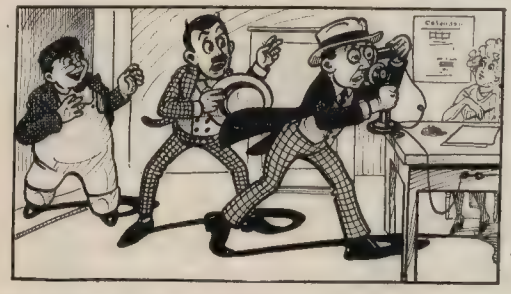
Old Dryroom Mike is gloomy because he cannot dry
Without a lot of cracks and warps that make his losses high.

He shows them how, in drying, the piece will check
and split
Because the too-dry air so quickly surface-hardens
it.

He leads them to a new plant where clay is dried
by air
That has a fixed humidity, be weather foul or fair.

Their fellow-manufacturer politely says he will
Be glad to show them how he dries with his Ejector
Kiln.

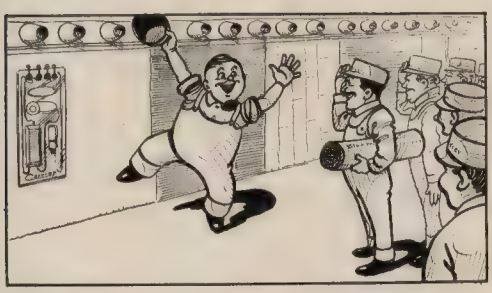
He shows them his new dryer, points out the nozzles there,
And tells them how efficiently they circulate the air.



The Messrs. Take and Mixit rush back and 'phone for "Mech."
"Hello," they say, "come out at once, before our plant's a wreck!"

"Mech" hurries out to meet them, a twinkle in his eye,
"A Carrier equipment will make your troubles fly."

And so Ejector Dryers are builded with great speed,
That from their sad predicament they quickly may be freed.



Old Dryroom Mike is joyful, for they have shown him how.
The automatic instruments control his drying now.

The owners say they've doubled their old capacity,
And this was brought about, you see, by Mike's sagacity.

## In a Lighter Vein

OH, Clarice, I'm so worried! You know you told me to put that piece of wedding-cake under my pillow and I'd dream of my future husband?"

"Yes, dear; didn't it work?"

"That's what worries me. I dreamed of the Seventy-first Regiment."—*American Legion Weekly.*

Flivver: "What's the most you ever got out of your car?"

Second Ditto: "I think seven times in one mile is my record."—*Orange Peel.*

Teacher asked her class if they could compose a rhyme, using the word "Nellie."

She finally called upon Johnny Jones.

Johnny arose, much embarrassed:

"There was a pretty little girl named Nellie
Who fell in the water and wet her little—
feet."

"Why, Johnnie, that doesn't rhyme."

"I know it doesn't—the water wasn't deep enough."

"Have you read 'Freckles'?"

"No, that's my veil."—*Exchange.*

"May I hold your Palmolive?"

"You bet your Lifebuoy."

"~~Every day a good day~~"

"Can anyone," said the teacher, "give me a sentence using the word *disarrange?*"

The first two or three pupils balked.

Finally her eye lighted upon little Angelo Giuliano.

"Angelo, can you give me a sentence?"

"Sure," said Angelo, "my papa he getta up disa morn and he lighta da kitchen stove. She smoke. He say: 'Damma disa range.' "

A garage man in Kansas City, on a lazy summer's morning, was standing in front of his place when a man in a Cataract Eight drove up and inquired the mileage to St. Louis.

"About a hundred and forty miles," said the garage man.

"Alright, give me twenty gallons of gas and two gallons of oil."

When he had departed, a second customer, driving an Upmobile, appeared.

"How far is it to St. Louis?"

"About a hundred and forty miles."

"Give me ten gallons of gas and three quarts of oil."

No sooner had the dust settled back upon the road when a third tourist brought his Flivver to a shuddering stop in front of the garage door.

"How far to St. Louis?"

"One forty."

"Gimme two quarts of water, a bottle of 3-in-1, and hold this blamed thing while I mop my brow."

## The Weather Vein

Father: "You must stop running around with that light-headed actress. That woman is driving you to Hades."

Son: "Well, it's a pleasant drive, Guv'-ner, believe me!"

The latest popular song on Broadway is entitled: "She Might Be a Bartender's Daughter, But I Love Her Still."

Gawge: "She's an Easter egg."
Chollie: "By which you mean?"
Gawge: "She's hard boiled and painted."

Patent No. 58214, an ornamental design for a Police Billy, has been awarded to Fred Biffar, of Chicago.

Doctor (musingly): "By the way, Bill, I've a rather unusual case just now."

Bill (promptly): "Great, I'll have one straight, if you don't mind."

A man is young so long as he will try a better way.—*Jim Henry.*

Daughter (seeking domestic instruction in view of her impending marriage): "How do you make hash, mother?"

Mother: "Mercy, child, you don't make hash. It accumulates."

## "Every day a good day"

Any of the following

# Carrier Bulletins

will be cheerfully
sent to you upon request

---

**No. 500**

**CARRIER AIR CONDITIONING EQUIPMENT**

**Humidifiers, Dehumidifiers, Auxiliary Apparatus and Methods of Automatic Control**

---

**No. 1020**

**Humidity and Temperature Regulating Devices**

---

**No. 1030**

**The Carrier System in the Textile Mill**

---

**No. 1060**

**Air Conditioning in the Modern Bakery**

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**No. 1110**

**The Drying and Conditioning of Rubber**

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**No. 2100**

**High Temperature Air for Drying and Processing**
**Harrison Aertube Heater**

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**INDUSTRIAL PIPING**

**A Bulletin describing the Work of our Piping Division**

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*"Weather"*

**A bound book, telling the fascinating story of Manufactured Weather**

# 1921

# SEPTEMBER

30 DAYS

You can make

"Every day a good day"

| SUN | MON | TUE | WED | THU | FRI | SAT |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
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| 25 | 26 | 27 | 28 | 29 | 30 | |

## AUGUST

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## OCTOBER

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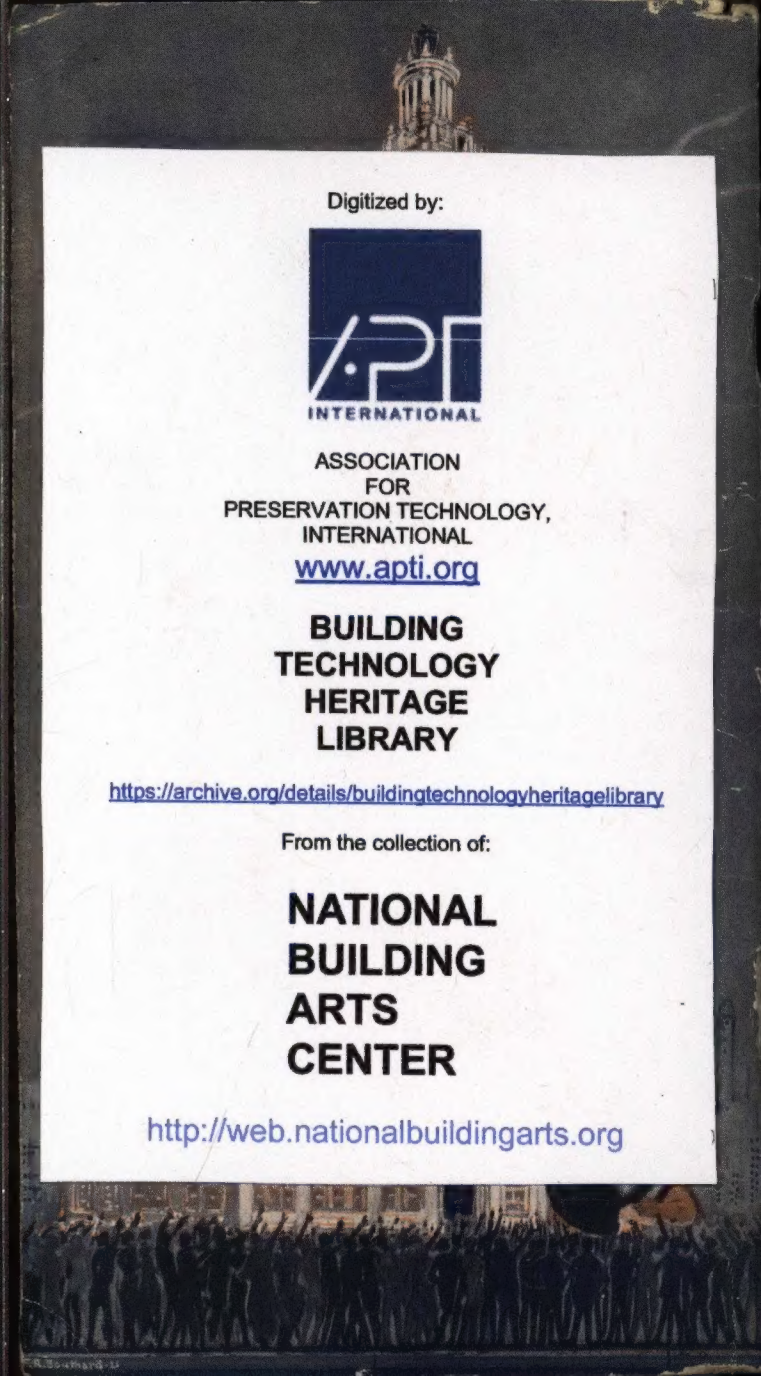
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |



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